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EXAMINER	
CATTUNGAL, SANJAY	
ART UNIT	PAPER NUMBER
3768	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/527,744	BABA ET AL.	
	Examiner	Art Unit	
	SANJAY CATTUNGAL	3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,11-29 and 31-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *29* is/are allowed.

6)☒ Claim(s) *1-9,11-29 and 31-34* is/are rejected.

7)☒ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/04/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1-9, 11-28 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,368,277 to Mao et al. in view of U. S. Publication No. 2003/0013964 U. S. Application No. 10/064,085 to Bjaerum et al.**

3. Regarding **Claim 1,** Mao teaches an image diagnostic apparatus comprising: imaging means for producing a tomographic image (ultrasound) of an object to be examined (abstract and fig. 1); a storing unit of storing a moving image formed by a plurality of frames of the tomographic image (col.3 lines 12-14 teaches a hard disk to store a series of images, line 20 teaches that the images could be of a blood vessel which would inherently be a moving image); and a display unit for displaying the moving image (Fig. 1 element 160), further comprising an operation unit for designating a desired portion of the tomographic image with a mark (fig. 1 element 140 and fig. 2 element 220 and 230 in frame A); and tracking means for making the mark follow the desired portion of the tomographic image from image information of the desired portion (fig. 1 element 140 and fig. 2 element 200 and new tracked position 201 in frame B).

4. Mao does not expressly teach that the tracking means stores coordinates of atleast two designated portions and calculates shift of distance over time and displays it as a graph on the display unit.

5. Bjaerum teaches that the tracking means stores coordinates of atleast two designated portions (fig. 5) and calculates shift of distance over time (fig. 6) and displays it as a graph on the display unit (fig. 7).

6. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mao with a setup to calculate shift of distance and displaying it on a graph as taught by Bjaerum since such a setup would result in real-time visualization of the displacement (paragraph 0008).

7. Regarding **Claim 2,** Mao teaches that the operation unit includes means for inputting a command to display a one frame image of the moving image stored in the storing unit on the display unit and a command to superpose the mark on the designated portion of a tissue the movement of which is tracked in the one frame image displayed (fig. 1 element 170 and 140 and fig. 2 element 200 is the mark and 201 teaches tracking of the region 220 in frame B).

8. Regarding **Claim 3,** Mao teaches that the tracking means includes cutout image setting means for setting a cutout image of a size including the designated portion corresponding to the mark on the one frame image displayed on the display unit (fig. 1 element 140 and fig. 2 element 200 in frame A), cutout image tracking means for reading out another frame images of the moving image from the storing unit and

extracting a local image of the identical size which is most coincided with the cutout image (fig. 2 element 201 in frame B), moving distance calculating means (fig. 1 element 140) for calculating a coordinate difference between the most coincided local image and the cutout image, and movement tracking means (fig. 1 element 140) for calculating the coordinate of the designated portion after movement on the basis of the coordinate difference (fig. 2 frame B shows element 201 in a new coordinate as such the difference between 200 and 201 can be calculated from the fig. 2 frame B reference by the image processor fig. 1 element 140).

9. Regarding **Claim 4,** Mao teaches that the cutout image tracking means extracts the most coincided local image by performing a correlation processing on image data of the cutout image and the local images (fig. 2 frame A and Frame B are local images where in the cutout-section –image processor from fig. 1 element 140- cutout 200 and 210 are correlated from Frame to Frame B as 201 and 211).

10. Regarding **Claim 5,** Mao teaches that the moving image stored in the storing unit is obtained based on an ultrasound imaging method while RF signals (as defined in the specification of the application as *signals obtained by performing reception processing on ultrasound echo signals, as such any ultrasound echo which has been processed could be considered an RF signal)* corresponding to the moving image are stored in the storing unit (col. 3 lines 12-14), and the movement tracking means (fig. 1 element 140) calculates a coordinate of the designated portion after movement on the basis of the coordinate difference (fig. 2 frame A and B), extracts a plurality of the RF signals corresponding to coordinates around the coordinate of the designated portion after

movement, calculates a cross correlation between the plurality of the extracted RF signals, and corrects the coordinate after movement based on a position of a maximum value of the cross correlation (Fig. 2 frame A and Frame B teaches marking regions/coordinates between plurality of rf signals/local frames and corrects movements as shown in fig. 2 frame b element 200 and 201, also cross correlation method is taught in col. 4 lines 62-65).

11. Regarding **Claim 6,** Mao teaches that the cutout image tracking means repeatedly performs the processings on another frame image of the moving image by using the extracted local image as the cutout image and sequentially extracts local images of the identical size which are most coincided with the cutout image, and the moving distance calculating means (fig. 1 element 140 and col. 4 lines 3-10) and the movement tracking means (fig. 1 element 140) calculate a coordinate difference between the sequentially extracted most coincided local images and the cutout image and calculate a coordinate of the designated portion after movement based on the calculated coordinate difference (fig. 2 frame B shows element 201 in a new coordinate as such the difference between 200 and 201 can be calculated from the fig. 2 frame B reference by the image processor fig. 1 element 140).

12. Regarding **Claim 7,** Mao teaches that the cutout image tracking means (fig. 1 element 140) searches local images to extract a local image of the identical size which is most coincided with the cutout image within a searchable range set to be an area having a set pixel value larger than that of the cutout image (fig. 2 frames A and B have a pixel value larger than cutout 200, 201, 210 and 211).

13. Regarding **Claim 8,** Mao teaches that the tracking means (fig. 1 element 140) stores the coordinate of the designated portion after movement and displays a movement trajectory of the mark superposed on the moving image (fig. 2 frame B shows a trajectory of how the marks have moved from 200 to 201 and 210 to 211).

14. Regarding **Claim 9,** Mao teaches that the tracking means (fig. 1 element 140) stores the coordinate of the designated portion after movement, calculates at least any one of a moving distance, and displays a shift thereof as a line view on the display unit (fig. 2 frame B shows the distance how much element 201 has moved from 200).

15. Regarding **Claim 10,** Mao teaches that the tracking means (fig. 1 element 140) stores coordinates of at least two designated portions (fig. 2 frame A and B element 200 and 210) input from the operation unit after movement, calculates at least any one of a distance between the two designated points, and displays it as a line view on the display unit (fig. 2 frame B shows the distance how much element 201 has moved from 200; and how much 211 has moved from 210).

16. Regarding **Claim 11**, Mao teaches that the tracking means (fig. 1 element 140) calculates at least any one of a thickness shift (Col. 4 lines 23-25 teaches "determining object of interest, e.g. blood, contrast agent, etc. from other representations, such as tissue, bones, etc" as they have different thickness) on the basis of at least two designated portions set inside and outside the cardiac muscle from the operation unit (fig. 2 frame B elements 200 and 201 shows two designated portions being monitored), and displays it as a line view on the display unit (fig. 1 element 160).

17. Regarding **Claim 12,** Mao teaches that the tracking means (fig. 1 element 140) calculates a position after movement of a plurality of designated portions along an inner wall of a cardiac ventricle input from the operation unit (fig. 2 frame B elements 200 and 201 shows two designated portions being monitored), calculates a capacity of the cardiac ventricle (col. 3 Lines 63-66) and a capacity shift based on a line connecting the plurality of the designated portions (col. 4 lines 1-2), and displays it on the display unit (fig. 1 element 160).

18. Regarding **Claim 13**, Mao teaches an operation unit for designating a region of interest (ROI) on the tomographic image (fig. 1 element 140) and following means (fig. 1 element 140) for extracting an image portion of the tomographic image (Fig. 2 frames A and B) corresponding to at least one part of the ROI and making a display position of the ROI follow the movement of the image portion (fig. 2 frame B elements 200 and 201 shows two ROI movements being tracked).

19. Regarding **Claim 14,** Mao teaches that the tracking means (fig. 1 element 140) for tracking the movement of the image portion by setting one or a plurality of reference points in the ROI and extracting one or a plurality of image portions corresponding to the reference points (fig. 2 frame B elements 200 and 210 shows two ROI being monitored), and control means for making the ROI displayed on the display unit follow the movement of the reference point corresponding to the image portion(fig. 2 frame B elements 200 , 201 and 210, 211 shows two designated portions being monitored and fig. 1 element 160).

20. Regarding **Claim 15,** Mao teaches a measured information calculating unit (fig. 1 element 140) for measuring information concerning the tissue from a pixel value inside at least either of the ROI before movement or the ROI after movement (fig. 2 frames A and B elements 200. 201, 210 and 211), and displaying a shift of the measured information as a line view on the display unit (figs. 2 frame A and B and fig. 1 element 160).

21. Regarding **Claim 16,** Mao teaches that the measured information includes brightness (col. 5 lines 25-28 and claim 6).

22. Regarding **Claim 17,** Mao teaches that the measured information calculating unit stores (fig. 1 element 140) coordinates of at least two ROIs input (fig. 2 frame A element 200 and 210) from the operation unit after movement (fig. 2 frame B element 201 and 211), calculates at least any one of a brightness (col. 5 lines 25-28) and displays it as a line view on the display unit (fig. 2 frame B).

23. Regarding **Claim 18,** Mao teaches a first step of displaying a one frame image of a moving image formed by producing tomographic images of an object to be examined (fig. 2 frame A and B); a second step of setting a designated portion by inputting a command to superpose a mark on the designated portion of a tissue the movement of which is tracked in the displayed one frame image (fig. 2 Frame A and B elements 220 and 230); a third step of setting a cutout image of a size including the designated portion in the one frame image (fig. 2 element 200 and 210); a fourth step of searching another frame images of the moving image and extracting a local image of the identical size which is most coincided with the cutout image (fig. 2 frame B); and a fifth step of

calculating a coordinate of the designated portion after movement based on a coordinate difference between the most coincided local image and the cutout image (fig. 2 frame B shows element 201 in a new coordinate as such the difference between 200 and 201 can be calculated from the fig. 2 frame B reference by the image processor fig. 1 element 140).

24. Mao does not expressly teach that the tracking means stores coordinates of atleast two designated portions and calculates shift of distance over time and displays it as a graph on the display unit.

25. Bjaerum teaches that the tracking means stores coordinates of atleast two designated portions (fig. 5) and calculates shift of distance over time (fig. 6) and displays it as a graph on the display unit (fig. 7).

26. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mao with a setup to calculate shift of distance and displaying it on a graph as taught by Bjaerum since such a setup would result in real-time visualization of the displacement (paragraph 0008).

27. Regarding **Claim 19,** Mao teaches that the fourth step, the most coincided local image is extracted by performing a correlation processing on image data of the cutout image and of the local image (fig. 2 frame A and Frame B are local images where in the cutout-section –image processor from fig. 1 element 140- cutout 200 and 210 are correlated from Frame to Frame B as 201 and 211).

28. Regarding **Claim 20,** Mao teaches that the moving image is produced by an ultrasound imaging method while RF signals (as defined in the specification of the

application as *signals obtained by performing reception processing on ultrasound echo signals, as such any ultrasound echo which has been processed could be considered an RF signal)* corresponding to the moving image are stored, and in the fourth step, a coordinate of the designated portion after movement is calculated based on the coordinated difference between the most coincided local image and the cutout image (fig. 2 frame A and B), a plurality of the RF signals corresponding to coordinates around the coordinate of the designated portion after movement are extracted, a cross correlation among the plurality of extracted RF signals are calculated, and the coordinate after movement is corrected in accordance with a maximum value of the cross correlation (Fig. 2 frame A and Frame B teaches marking regions/coordinates between plurality of rf signals/local frames and corrects movements as shown in fig. 2 frame b element 200 and 201, also cross correlation method is taught in col. 4 lines 62-65).

29. Regarding **Claim 21,** Mao teaches that the extracted local image is set as the cutout image, the fourth and fifth steps are repeatedly executed on another frame images of the moving image, and a coordinate of the designated portion after movement is sequentially calculated (fig. 2 frame B shows element 201 in a new coordinate as such the difference between 200 and 201 can be calculated from the fig. 2 frame B reference by the image processor fig. 1 element 140).

30. Regarding **Claim 22,** Mao teaches that the cutout image has a size including a tissue other than the tissue of the designated portion (Fig. 2 frame A element 200 and 220, element 200 has a larger area which includes 220 as such it includes other tissue).

31. Regarding **Claim 23,** Mao teaches that the fourth step, the searchable range where a local image of the identical size which is most coincided with the cutout image is extracted is set to be an area having the set pixel number larger than that of the cutout image (fig. 2 frames A and B have a pixel value larger than cutout 200, 201, 210 and 211).

32. Regarding **Claim 24,** Mao teaches that the mark is displayed at the position of the designated portion after movement on the moving image in the display (fig. 2 frame b element 200 and 201 -201 is dotted to show the movement-).

33. Regarding **Claim 25,** Mao teaches that the coordinate of the designated portion after movement is stored and a movement trajectory of the mark is superposed on the moving image in the display (fig. 2 frame B shows a trajectory of how the marks have moved from 200 to 201 and 210 to 211).

34. Regarding **Claim 26**, Mao teaches that the coordinate of the designated portion after movement is stored, further including a sixth step of calculating at least any one of a moving distance of the designated portion (fig. 2 frame B shows the distance how much element 201 has moved from 200).

35. Regarding **Claim 27,** Mao teaches that a shift of at least distance is displayed as a line view (fig. 2 frame B shows the distance how much element 201 has moved from 200).

36. Regarding **Claim 28,** Mao teaches that a plurality of designated portions are set on a cardiac wall of cardiac muscle, a moving direction of each designated portion is calculated (fig. 2 frame B teaches the direction in which element 201 has moved from

200), and its shift along time is displayed in the image while a reference point in a moving direction is set as a gravity center and a direction toward the gravity center and a direction against the gravity center are respectively presented in different colors (fig. 2 frame B shows the distance how much element 201 has moved from 200 and col. 3 lines 60-65 teach the use of color to determine results).

37. Regarding **Claim 30,** Mao teaches that at least two designated portions are set and coordinates of the two designated portions after movement are stored (fig. 2 frame B element 200 and 210), further including a sixth step of calculating a distance between the two designated portions (fig. 2 frame B shows the distance how much element 201 has moved from 200; and how much 211 has moved from 210).

38. Regarding **Claim 31,** Mao teaches a sixth step of setting at least two designated portions inside and outside cardiac muscle and calculating a thickness change (Col. 4 lines 23-25 teaches "determining object of interest, e.g. blood, contrast agent, etc. from other representations, such as tissue, bones, etc" as they have different thickness).

39. Regarding **Claim 32,** Mao teaches that a plurality of the designated portions (fig. 2 frame B elements 200 and 201 shows two designated portions being monitored), are set along an inner wall of a cardiac ventricle, and a capacity and a capacity shift of the cardiac ventricle is calculated on the basis of a line connecting the plurality of the designated portions (col. 4 lines 1-2).

40. Regarding **Claim 33,** Mao teaches that the second step a command to superpose a mark identifying the ROI on the tissue in the displayed one frame image is input (fig. 2 element 220), in the third step a reference point is determined

corresponding to the ROI and a cutout image of a size including the reference point is set in the one frame image (fig. 2 element 200 and 230, where in 200 is a cutout image and 230 is a reference point), and in the fifth step a coordinate of the mark identifying the ROI after movement is calculated on the basis of the stored coordinate of the reference point after movement, and the mark is superposed on another frame image of the moving image in the display (fig. 2 frame B element 200 and shows an ROI being monitored and element 201 shows the moved position with 200 being superposed on Frame B).

41. Regarding **Claim 34,** Mao teaches that the tracking means includes correlation means for calculating a correlation of the image information between the one frame image (fig. 2 frame A) and an adjoining frame image (fig. 2 Frame B) of the moving image and acquires positional information of the mark corresponding to the desired portion in the adjoining frame image from the correlation value (fig. 2 frame B element 200 and shows an ROI being monitored and element 201 shows the moved position with 200 being superposed on Frame B).

Allowable Subject Matter

42. **Claim 29** is allowed.

Response to Arguments

43. Applicant's arguments filed 09/10/2010 have been fully considered but they are not persuasive. Applicant argues that Mao does not teach that the tracking means

stores coordinates of at least two designated portions and calculates shift of distance over time and displays it as a graph on the display unit.

44. Examiner agrees with the applicant but would like to point out that a new reference in view of has been cited to teach this limitation U. S. Publication No. 2003/0013964 U. S. Application No. 10/064,085 to Bjaerum et al. Bjaerum teaches that the tracking means stores coordinates of at least two designated portions (fig. 5) and calculates shift of distance over time (fig. 6) and displays it as a graph on the display unit (fig. 7). As such all claim limitations have been met and the rejection is made **FINAL.**

Conclusion

45. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

46. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SANJAY CATTUNGAL whose telephone number is (571)272-1306. The examiner can normally be reached on Monday-Friday 9-5.

48. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

49. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SANJAY CATTUNGAL/
Examiner, Art Unit 3768

/Long V Le/
Supervisory Patent Examiner, Art Unit 3768